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Explanation of Plates.

(PLATE CLXII.)

Lepidozia sphagnicola, n. sp.

- Fig. 1. Plants, natural size.
 Fig. 2. Part of stem, postical view.
 Fig. 3. Stem-leaf.
 Fig. 4. Branch-leaf.
 Fig. 5. Stem-underleaf.
 Figs. 6-8. Branch-underleaves.
 Fig. 9. Inner bract.
 Fig. 10. Perianth.

(PLATE CLXIII.)

Jungermannia Novæ-Cæsareæ, n. sp.

- Fig. 1. Plants, natural size.
 Fig. 2. Apex of stem with perianth, postical view.
 Fig. 3. Antheridial stem, antical view.
 Figs. 4-5. Parts of sterile stems, postical view.
 Figs. 6-7. Perichaetial bracts (fig. 7 showing connate bracteole).
 Fig. 8. Transverse section of perianth.
 Fig. 9. Teeth from mouth of perianth.

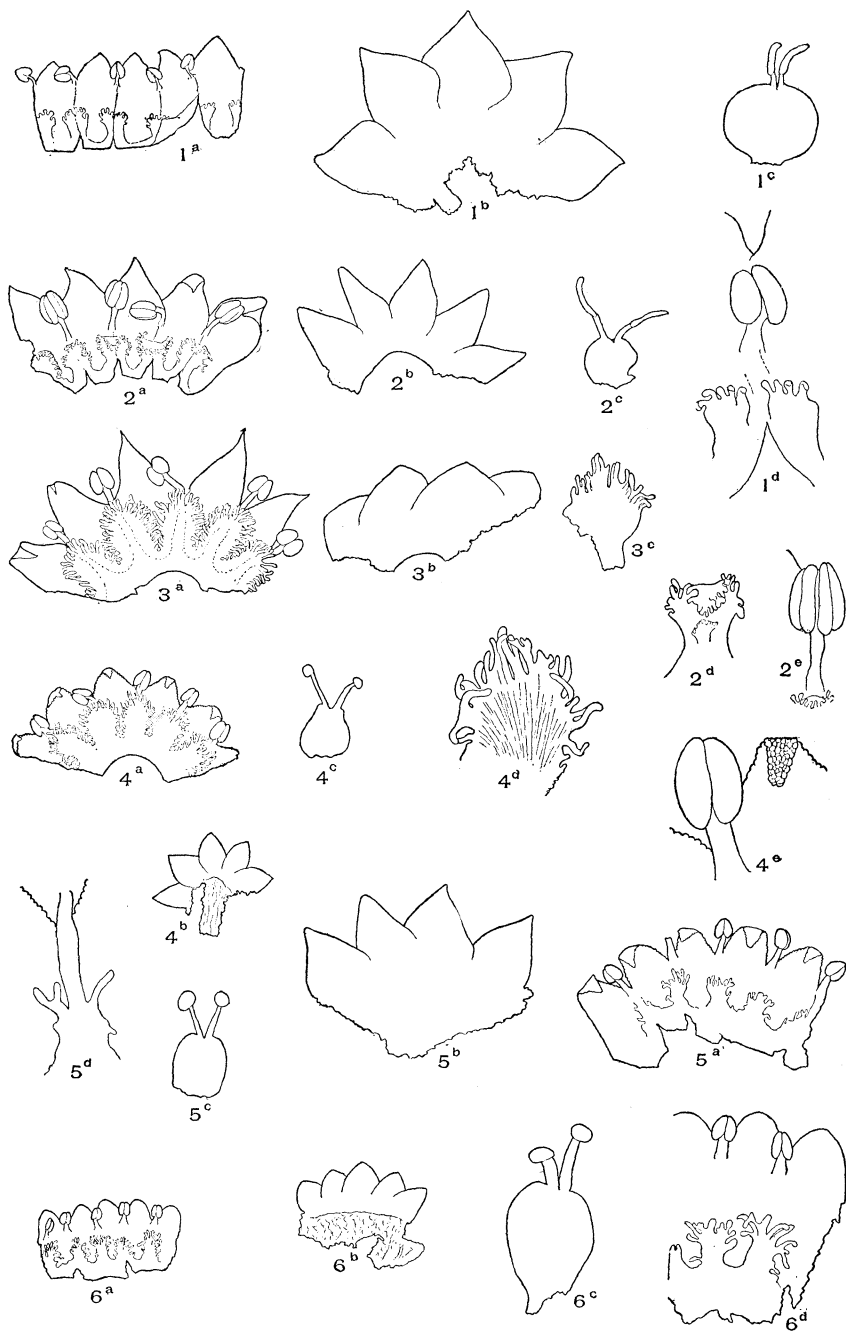
A Study of the Scale-characters of the Northeastern American Species of *Cuscuta*.

BY W. D. MATTHEW.

(PLATES CLXIV.-CLXV.)

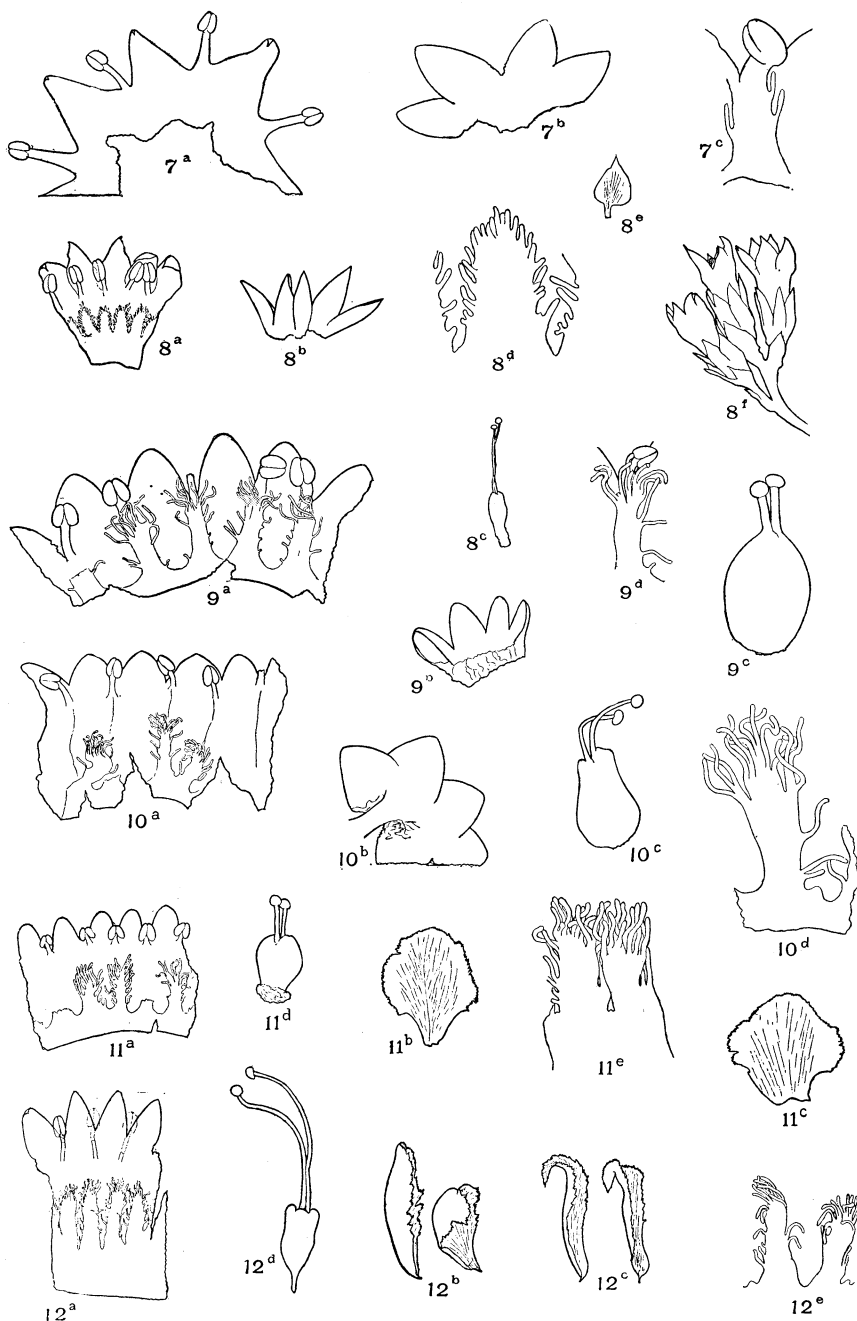
In the schemes for the classification of *Cuscuta*, the scale-characters are given but small prominence, though it would seem that as a convenient means of distinguishing the species one from another they may be of considerable service. They vary a great deal in the different species, but are apparently quite constant in each and seem to belong to two or three distinct types. The classification here made is intended rather as a key than as any attempt at a systematic division.

The scales may be separated from the first into two types, one of which is deeply crenulate, the other fringed with processes. To the first class belong the two introduced species, *C. Epilinum*



STUDIES IN CUSCUTA—W. D. MATTHEW.

BULLETIN OF THE TORREY BOTANICAL CLUB.—PLATE CLXV.



STUDIES IN CUSCUTA—W. D. MATTHEW.

and *C. Epithymum*; to the second all our native species. The latter may be divided into those with ovate scales and short, irregular processes, of which *C. arvensis* is a type; and those with ribbon-shaped scales and long regular processes, of which *C. Gronovii* is a type. One species, *C. cuspidata*, is intermediate in scale-characters between these two divisions, though nearer to the type of *arvensis*; and three others have the scales greatly reduced, of which one, *C. Coryli*, is closely connected with *C. indecora*, of the *arvensis* type; another, *C. Polygonorum*, seems related to *C. arvensis* itself; and the third, *C. Cephalanthi*, has the scales of moderate size and also of this type.

The long-fringed scales are remarkable in their shape, and are fringed thickly at the tip, but very sparingly towards the base, with long rounded processes. In two of the species, *C. Gronovii* and *C. rostrata*, they appear softer and more flexible than in the other two; but the chief reliance in separating these must be placed on the corolla lobes and on the serrate bracts which surround the calyx in the two last species.

While this division of our Northeastern American species is by no means as exact as that ordinarily given; yet as it depends only on characters observable in the dissected flower, it may be found at times more convenient than that based on the position of the withered corolla on the fruit, a point only seen in fruiting specimens, and then not always easy to determine, as the corolla in some species soon falls away.

DIVISION OF CUSCUTA ACCORDING TO SCALE-CHARACTERS.

I. Scales crenulate.

* Scales not incurved, less than one-half as long as the corolla-tube, crenulate at ends 1. *C. Epilinum*.

* Scales strongly incurved, about one-half the tube length, crenulate to the base. 2. *C. Epithymum*.

II. Scales fringed with processes.

* Scales large, ovate, heavily fringed to the base with short, irregular processes.

† Corolla lobes recurved, acute, as long as tube. 3. *C. arvensis*.

†† Corolla lobes incurved, broad triangular, half as long as tube.

4. *C. indecora*.

** Scales small or nearly aborted (but apparently similar in general type to the last division).

† Scales variable, almost aborted, tips of corolla lobes inflexed.

5. *C. Coryli*.

- †† Scales small, irregularly fringed, lobes of corolla ovate, less than one-half length of tube, their tips not incurved . . . 6. *C. Cephalanthi*.
 ††† Scales reduced to a couple of hairs on each side of the attached part of the filament 7. *C. Polygonorum*.
 *** Scales of moderate size, fringed to the base with rather short, regular hairs. Corolla lobes acute, half the length of the tube . . . 8. *C. cuspidata*.
 **** Scales long, fringed chiefly at the tip, sparingly towards the base, with long regular processes.
 † Processes rather softer and more flexible; no serrate bracts on calyx.
 ‡ Corolla lobes nearly as long as tube 9. *C. Gronovii*.
 †† Corolla lobes less than half as long as tube . . . 10. *C. rostrata*.
 †† Processes stiffer and rounder; serrate bracts surrounding calyx.
 ‡ Corolla lobes ovate; bracts few in number, broad and serrate.
 11. *C. compacta*.
 †† Corolla lobes acute; bracts numerous, narrow, serrate, recurved at tip 12. *C. glomerata*.

Following is a short description of the characters of each species, with special reference to the scale characters. For a more complete description of other characters, reference should be made to Engelmann's studies on the genus:

C. EPILINUM.—Flowers sessile, 5-parted, in small round dense heads. Calyx of 5 broad-pointed spreading sepals, as long as the corolla tube. Corolla lobes half as long as tube, broad, blunt-pointed. Stigmas filiform; stamens with short filaments and broad anthers. Scales less than half length of tube, divided at centre, fringed at ends with about 4 or 5 deep crenulations, thin in substance. Capsule regularly circumscissile, capped by the withered corolla.

C. EPITHYMUM.—Flowers 5-parted, sessile in small round dense heads. Calyx of narrow pointed sepals, $\frac{2}{3}$ length of corolla tube. Lobes of corolla nearly as long as tube, rather broad, acute pointed. Stigmas filiform; stamens with short filaments and long anthers, the two lobes of the latter strongly furrowed. Scales thin, strongly incurved, half length of tube, fringed nearly to the base with deep irregular crenulations. Capsule regularly circumscissile, capped by the withered corolla.

C. ARVENSIS.—Flowers 5-parted, on short pedicels, in rather loose clusters. Calyx lobes very broad and blunt pointed, not exceeding corolla tube. Corolla lobes recurved, acute, as long as tube. Stigmas round (as they are in all the succeeding species); anthers broad. Scales large, confluent at base, broad-ovate, equalling or

exceeding tube, profusely fringed from tip to base with short irregular processes.

C. INDECORA.—Flowers in large loose clusters. Calyx lobes ovate, pointed, shorter than corolla tube. Corolla bell-shaped, lobes triangular, minutely crenulate, two-thirds length of tube, their tips incurved. Scales large, broad, ovate, confluent, irregularly, fringed with short processes to the base.

C. CORYLI.—Flowers in loose clusters, 4–5 parted. Calyx lobes triangular to lanceolate, equalling length of corolla tube. Corolla narrow bell-shaped, lobes acute, minutely crenulate, about equalling length of tube, strongly inflexed. Scales very small and thin, separate at base, with a few short hairs on each side.

C. CEPHALANTHI.—Flowers 5-parted, in rather dense clusters. Calyx lobes ovate, $\frac{2}{3}$ length of corolla tube. Lobes of corolla blunt, ovate, spreading, half the length of tube. Scales about half the length of tube, fringed chiefly at tip with irregular short hairs.

C. POLYGONORUM.—Flowers 4–5-parted, in loose clusters. Calyx lobes narrow, ovate. Corolla lobes triangular, longer than tube. Scales almost obsolete, consisting of two or three hairs on each side of the attached part of the filament; they are so small and thin as to be almost indistinguishable.

C. CUSPIDATA.—Flowers in large branching clusters, long and narrow, with two or three bracts at base. Calyx in specimen examined of five lanceolate lobes, $\frac{2}{3}$ length of corolla tube. Lobes of corolla lanceolate-triangular half length of tube. Scales narrow and long, $\frac{1}{2}$ to $\frac{2}{3}$ length of tube, confluent at base, fringed from tip to base with short, moderately regular processes.

C. GRONOVII.—Flowers 5-parted, bell-shaped, in small clusters. Calyx $\frac{2}{3}$ length of corolla tube of 5 long, ovate lobes. Corolla lobes nearly equalling length of tube, rounded, ovate, spreading. Scales narrow, ribbon-like, equalling or slightly exceeding the tube, fringed thickly at tip and very sparingly along the sides, with long cylindrical processes, each about half the length of the scale.

C. ROSTRATA.—Flowers large, loosely clustered. Calyx of 5 broad, ovate-triangular lobes, about $\frac{1}{3}$ length of corolla tube. Corolla lobes broadly ovate, about $\frac{1}{3}$ length of tube. Scales somewhat variable, ribbon-shaped to spatulate, fringed at tip and sparingly on the sides with processes similar to those of the last species.

C. COMPACTA.—Flowers sessile in dense masses, having 3 or 4 solid-ribbed rhombiform bracts, and a calyx of 5 separate sepals, which are oblong, blunt-pointed, thinner than the bracts, otherwise very similar to them. Corolla lobes ovate, about $\frac{1}{3}$ length of tube. Scales half the length of tube, generally more or less ribbon-like, fringed chiefly at tip with long processes, which are somewhat rounder and stiffer than in the two preceding species.

C. GLOMERATA.—Flowers sessile in very dense cylindrical masses, having numerous, narrow, strongly ribbed, recurved serrate bracts, and calyx of five separate sepals, which are like the bracts, but broader and less strongly ribbed. Corolla lobes lanceolate-triangular, $\frac{1}{4}$ length of tube, which scarcely exceeds the calyx bracts. Scales ribbon-like, $\frac{2}{3}$ length of tube, fringed copiously at tip, sparsely on sides, with processes like those of the last species.

Description of Plates CLXIV. and CLXV.

- Fig. 1, a-c, *C. Epilinum*—1a, corolla laid open $\times 5$; 1b, calyx laid open $\times 5$; 1c, ovary $\times 5$; 1d, scale and stamen $\times 12$.
- Fig. 2, a-e, *C. Epithymum*—2a, corolla laid open $\times 6$; 2b, calyx laid open $\times 6$; 2c, ovary $\times 6$; 2d, scale $\times 15$; 2e, anther $\times 15$.
- Fig. 3, a-c, *C. arvensis*—3a, corolla laid open $\times 9$; 3b, calyx laid open $\times 9$; 3c, scale $\times 11$.
- Fig. 4, a-e, *C. indecora*—4a, corolla laid open $\times 4$; 4b, calyx laid open $\times 4$; 4c, ovary $\times 4$; 4d, scale $\times 12$; 4e, anther and corolla lobe $\times 12$.
- Fig. 5, a-d, *C. Coryli*—5a, corolla laid open $\times 6$; 5b, calyx laid open $\times 6$; 5c, ovary $\times 6$; 5d, scale $\times 15$.
- Fig. 6, a-d, *C. Cephalanthi*—6a, corolla laid open $\times 3$; 6b, calyx laid open $\times 3$; 6c, ovary $\times 9$; 6d, scales and stamens $\times 9$.
- Fig. 7, a-c, *C. Polygonorum*—7a, corolla laid open $\times 6$; 7b, calyx laid open $\times 6$; 7c, scale and anther $\times 12$.
- Fig. 8, a-f, *C. cuspidata*—8a, corolla laid open $\times 5$; 8b, calyx laid open $\times 5$; 8c, ovary $\times 5$; 8d, scale $\times 12$; 8e, bract $\times 3$; 8f, flowers $\times 4$.
- Fig. 9, a-d, *C. Gronovii*—9a, corolla laid open $\times 9$; 9b, calyx laid open $\times 5$; 9c, ovary $\times 9$; 9d, scale $\times 10$.
- Fig. 10, a-d, *C. rostrata*—10a, corolla laid open $\times 5$; 9b, calyx laid open $\times 5$; 9c, ovary $\times 5$; 9d, scale $\times 11$.
- Fig. 11, a-e, *C. compacta*—11a, corolla laid open $\times 5$; 11b, sepal $\times 5$; 11c, bract $\times 5$; 11d, ovary; 11e, scale $\times 9$.
- Fig. 12, a-e, *C. glomerata*—12a, corolla laid open $\times 5$; 12b, sepal $\times 5$; 12e, bracts $\times 5$; 12d, ovary $\times 5$; 12e, scales $\times 12$.